ing cards, he made, in all, 2,927 trials, and obtained 789 successes instead of 732, which is the number that chance alone would lead him to expect. The probability that the actual number of successes shall differ from the probable number in either direction by so much as 57 in 2,927 trials (by λ in s trials, say) is approximately, —

$$1 - \frac{2}{\sqrt{\pi}} \int_0^{\lambda \sqrt{2pqs}} e^{-t^2} dt,$$

which gives in the present case $\frac{1}{70}$; that is to say, there is in reality one chance in seventy of so great a deviation arising by accident, while Richet would make it fifty in fifty-one.

We repeat that many of Mr. Richet's experiments are interesting, and the results very striking. It is a pity that they are not more effective than they are in placing the question of mental suggestion upon a scientific basis. CHRISTINE LADD FRANKLIN.

THE DIMENSIONS OF SHIPS.

I HAVE often thought, that, in practising the art of ship-building, men have too much neglected the study of the forms of the fish which make the waters their permanent habitation, and are designed for the most part to attain the highest degree of velocity in the pursuit of their prey. No doubt, the case of a ship partly, and that of a fish wholly, immersed, are not strictly parallel; but they offer very many points for comparison of which we may avail ourselves.

A fish makes use of its tail-fin as the chief and nearly sole instrument of propulsion; and, in the adoption of the screw-propeller in preference to the old side-wheels, the steamers of the present day have secured a great advantage over the old forms. In the proportion of length to those of breadth and depth, however, although there has of late been some improvement, there would appear to be a lingering tendency to hold by the old mistaken idea that a ship was rather to be regarded as a wedge to cut the water than as occupying the space of a wave of displacement; and so we have ships nine, ten, or even eleven times as long as broad, and twenty times the length that they have draught. Now, knowing as we do the magnitude of the skin-resistance in ships, and its smallness in the oily coats of fishes, one would expect that the length of the latter would be greater proportionally than that of the former, if ships were built in the proper form to secure a high velocity. But what is the fact? On an average of sixteen fresh-water fish delineated in Daniell, I find that the extreme length, inclusive of the tail-fin, is four and twenty-two hundredths times that of the extreme depth exclusive of the dorsal and ventral fins. The average breadth will be perhaps one-half of the depth, making the proportion to length about 1:8.

Abstract of a paper by Dr. J. P. JOULE, published in the Proceedings of the Manchester literary and philosophical society.

On an average of three species of whale, the narwhal, Greenland shark, dolphin, and the porpoise, I find from Scoresby and other authorities the proportion of either depth or breadth to length to be about 1:4.7, they having nearly circular sections. Therefore it appears, that, while in ships the proportion of length to width of midship immersion is 5:1, that of the shark, the porpoise, or dolphin, is not more than 1.5:1.

Dr. Scoresby, in his 'Arctic regions,' gives twelve miles per hour as the utmost speed of the whale; but Mr. Baxendell gives it a velocity approaching twenty miles. I had an opportunity of witnessing the wonderful swimming-powers of the porpoise during a voyage to the Clyde in the Owl steamer on the 29th of June last. About eight A.M., the sea being calm near the Mull of Galloway, we were beset by a shoal of these animals, which raced with the ship, and kept alongside for three or four minutes with the greatest ease. They swam in twos and threes, at a foot or two distant from one another, several approaching within ten feet of the vessel, which was steaming at the rate of thirteen and four-tenths statute miles per hour. If such a velocity can be maintained by the porpoise, with its comparatively bluff figure-head, we may surely expect a much higher velocity in the case of fish more obviously designed for speed.

My son tells me that in a voyage of the Malvina from Leith to London he had observed at night two fishes of about a yard long which kept for a considerable time in advance of the cutwater of the ship, being visible by their phosphorescent light. The ship was at the time steaming at the rate of fifteen and two-tenths statute miles per hour.

The investigation of the resistance of solids moving in fluids has been taken up theoretically by Thomson, Stokes, Rankine, and practically by Froude, who has found that the surface friction in long iron ships is more than fifty-eight per cent of the whole. Froude recognized the study of the forms of animal life in guiding us to practical conclusions.

From the above considerations, I am inclined to believe that a length of not more than five to one of breadth would be better than the extreme proportions of ships now in vogue, and that the greatest breadth should be considerably in advance of the midship.

RECENT TRAVELS IN ARABIA.

FROM the recently printed account of Mr. Charles Huber's mission in Arabia we cull some notes of general interest.

On an excursion to the great mountain Jebel Aga, the party camped at the entrance of the Tuarin valley, near the ruins of the little fortress El Asfar. Three palms grow here; and there is a little spring whose temperature, 75° F., indicates the heat of the soil and rock in this arid region. Around the ruins were traces of cultivation and abandoned wells. At a short distance the traveller was fortunate enough